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SIGMA XI QUARTERLY

Vol. XX JUNE, 1932 No. 2

INSTALLATION NUMBER

WICKENDEN ON "SCIENCE IN A CHANGING SOCIETY"

AVINOFF ON "THE ART OF PALEOLITHIC AND NEOLITHIC MAN"

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SIGMA XI QUARTERLY

VOL. XX JUNE, 1932 No. 2

THE INSTALLATION AT WESTERN RESERVE UNIVERSITY

The installation meeting of the Western Reserve Chapter of the Society of the Sigma Xi was held in the Institute of Pathology on February 24, 1932, at 2 P.M.

The following members of the Society were present:

I. Representatives of the National Society:

1. Prof. Leon J. Cole, University of Wisconsin
2. Dean Edward Ellery, Union College, Schenectady

II. Delegates from other Chapters:

1. Dean Theodore M. Focke } Case School of Applied Sci-
2. Prof. Dayton C. Miller } ence
3. Prof. Davenport Hooker, University of Pittsburgh
4. Prof. Howard B. Lewis, University of Michigan
5. Prof. Clarence H. Kennedy, Ohio State University

III. Members of the Faculty, Western Reserve University:

Name	*Branch of Science*	*Rank*	*Chapter at Which Elected*
Bertil G. Anderson	Biology	Instructor	Iowa
Franklin J. Bacon	Pharmacognosy	Professor	Wisconsin
O. W. Barlow	Pharmacology	Asst. Prof.	Missouri
Franklin C. Bing	Biochemistry	Instructor	Yale
Richard A. Bolt	Public Health	Associate	California
Harold S. Booth	Chemistry	Assoc. Prof.	Cornell
Moffatt G. Boyce	Mathematics	Instructor	Chicago
Helen B. Brown	Pediatrics	Special Chemist	Yale
Marion Cleaveland	Chemistry	Instructor	Columbia
Mary E. Collett	Physiology	Assoc. Prof.	Pennsylvania
V. Richard Damerell	Chemistry	Instructor	Washington
James A. Doull	Public Health	Professor	Johns Hopkins
James C. Gray	Biology	Instructor	Chicago
Joseph M. Hayman, Jr.	Medicine	Assoc. Prof.	Pennsylvania
Francis H. Herrick	Biology	Prof. Emeritus	Case (hon.)
Amos H. Hersh	Biology	Asst. Prof.	Illinois

Name	*Branch of Science*	*Rank*	*Chapter at Which Elected*
Jesse E. Hyde	Geology	Professor	Ohio State
Frederick C. Jonah	Mathematics	Asst. Prof.	Brown
Howard T. Karsner	Pathology (Inst. of)	Professor and Director	Pennsylvania
S. Charles Kendeigh	Biology	Instructor	Illinois
H. W. Mountcastle	Physics	Professor	Case
James W. Mull	Biochemistry	Senior Instructor	Iowa
Edw. Muntwyler	Biochemistry	Senior Instructor	Iowa
Victor C. Myers	Biochemistry	Professor	Yale
Oliver A. Ohmann	Psychology	Assoc. Prof.	Iowa
Addie E. Piehl	Biology	Instructor	Wisconsin
John P. Quigley	Physiology	Senior Instructor	Minnesota
Daniel P. Quiring	Biology	Instructor	Illinois
David Seecof	Pathology	Asst. Prof.	Colorado
Alfred T. Shohl	Pediatrics	Assoc. Prof.	Yale
Eugene W. Skinner	Metallurgy	Asst. Prof.	Iowa
Roland C. Travis	Psychology	Assoc. Prof.	Iowa
J. Paul Visscher	Biology	Assoc. Prof.	Johns Hopkins
Wm. G. Vinal	Nature Educ.	Professor	Brown
Wayne E. White	Chemistry	Instructor	Kansas
Carl J. Wiggers	Physiology	Professor	Michigan

Owing to illness, Dr. Louis B. Wilson, President of the Society and Director for Medical Education and Research, Mayo Foundation, University of Minnesota, was unable to attend, and in his absence Professor Leon J. Cole of the University of Wisconsin presided.

For the Petitioners, Professor J. Paul Visscher read the petition for the charter.

Dean Ellery announced that the National Convention assembled at New Orleans in December, 1931, granted the petition by unanimous vote. Today's assemblage was called for the purpose of carrying out the official act of that Convention.

Professor Karsner presented the following faculty members, all of whom had signed the original petition, as candidates for initiation into the Society:

From the Department of Anatomy:

Prof. T. Wingate Todd, M.D., Ch.B. (Manchester), F.R.C.S. (Eng.)

From the Department of Histology and Embryology:

Prof. Frederick C. Waite, Ph.D.

From the Department of Pediatrics:

Prof. H. J. Gerstenberger, M.D.

From the Department of Pharmacology:

Prof. Torald Sollmann, M.D. (Dean of School of Medicine)

From the Department of Surgery:
Prof. Elliott C. Cutler, M.D.

Professor Karsner also presented for initiation Prof. H. Austin Aikins (from the Department of Psychology) whose name was inadvertently omitted from the list of petitioners.

Emeritus Professor Roger G. Perkins (Hygiene and Bacteriology) and Professor Joseph T. Wearn (Medicine), two other candidates who had signed the petition, were not able to be present. They are eligible for election at a later date.

The candidates were addressed by Professor Cole, who sketched the objectives of the Society. He pointed out that Sigma Xi is an Honorary Society, yet the membership should be recruited from those of promise as well as from those of great accomplishment. The encouragement of research as well as its reward is the purpose of the Society. The members are united, not by personal friendship, but by a common objective. Community of interest, but without sacrifice of independence of thought, is the highest aim of the Society.

After each candidate had assented to the pledge required by the constitution, Professor Cole pronounced them to be Members and welcomed them into the companionship of the Society.

Presentation of the Charter and Charge to the Chapter

On behalf of the Petitioners, Professor Wiggers received the Charter of the Chapter from Professor Cole, who formally announced the establishment of the Chapter and read his Charge. He stated that the Western Reserve Chapter is the 59th to be organized since the establishment of the Society at Cornell University in 1886. There are now approximately 10,000 members. Since the foundation of the Society many other organizations have come into existence, tending to raise the standards of Sigma Xi to a higher level. Each chapter has its own methods of carrying out the common objective of inspiring research activity, particularly in younger men. Election itself is a stimulus; so also is the contact with older men in meetings of the Chapter.

Scientific men have a duty to the community and certain chapters have recognized this by the establishment of lecture courses. At Yale such a series was given on "The Evolution of Man;" at Pittsburgh on "The Culture of Prehistoric Man."

Certain chapters offer prizes for the best graduate or undergraduate

work of the year. Sometimes prizes are offered for faculty research, the local chapter calling on others not connected with the Chapter to make the award. No attempt is made by the national society to conduct the affairs of local chapters, each of which has its own problems to face.

Symposium on Methods of Achieving the Purposes of the Organization

I. Details Regarding the Methods by Which the Work of the National Society Is Integrated with That of the Local Chapters

Dean Ellery: (1) The old practice was to publish annually the reports of the several chapters. Even before this delegates from each chapter reported at the Annual Convention. At present the office of the National Secretary is the place of record of the activities of the various chapters. An attempt is being made to classify these activities. For example, the lectures given are being classified according to the branch of science with which they deal and a list is published at some time during the year. Any member interested in some particular field, such as biochemistry, is thus enabled to get in touch with other members engaged in similar lines of work. (2) The National organization has also assumed the responsibility of publishing, in the official Bulletin, certain public lectures to which reference has been made, such as the Minnesota series. Part of the Pittsburgh series will also be published. (3) Awards of prizes by the various chapters are recorded by the National Secretary and published in the official Bulletin of the Society. (4) The office of the National Secretary is in constant contact with the secretary of the local chapter, acquainting the chapter with the actions of the Executive Committee. Frequently it is desirable to obtain the reaction of the various chapters to certain questions prior to the Annual Convention. (5) Suggestions are solicited from the chapters with regard to the policy of the Society and the conduct of its business.

II. Ideals Which Lie Behind Election to Membership

Professor Cole: There are a number of chapters which do not elect to Associate Membership. The basis for choice of members is found in the Constitution of the Society.

III. At What Period in College Life Should a Student Be Elected to Membership?

Dean Ellery: Until a student has completed two and a half

years of undergraduate work he is not eligible for election to Associate Membership in the Society. Under the charter granted to the Western Reserve Chapter no undergraduate can be elected to Membership. In the older chapters founded prior to 1922, this is not the case, and promising undergraduates may be elected members. What shall constitute "noteworthy achievement" or "aptitude" is left for the chapter to determine.

IV. Grants-in-Aid or Facilities for Publication

PROFESSOR COLE: The Society has a fund, distributed by a special committee for purposes of grants-in-aid. Recipients are not limited to members. Application is made to the National Secretary, who turns it over to the Committee on Grants. These grants may be given to assist publication as well as to aid research. For example, a grant, of perhaps $250, has recently been made to a University of Pennsylvania worker for the preparation of some lithographs needed for illustration.

V. The Amount of Money Available for Grants-in-Aid

PROFESSOR COLE: There is about $3500 which has been contributed by alumni members, and which is available for immediate use. As a rule individual grants are less than $500.

VI. Publication of the Sigma Xi Lectures Given at the University of Pittsburgh

DEAN ELLERY: These will be published in the official Bulletin, perhaps beginning with the June issue.

REPORT OF THE ORGANIZATION COMMITTEE

The following officers whose names were presented by the Chairman of the Organization Committee were elected by unanimous vote:

President, Prof. V. C. Myers
Vice-President, Prof. H. S. Booth
Secretary, Prof. J. A. Doull
Treasurer, Prof. A. H. Hersh

The By-Laws were then unanimously adopted.

Professor Cole installed Professor Myers as the first President of the Chapter and surrendered the Chair. Dr. Myers made a brief address as follows:

"The installation of Sigma Xi will go down as an important milestone in the history of graduate education in pure and applied

science at Western Reserve University. Graduate education depends upon research, and research may be defined as the unraveling of the unknown by experiment, guided by reason and imagination. The greatest stimulus comes from contact with others, fired with the zeal for investigation, and hence the reason for our banding together in Sigma Xi, whose Greek motto means, 'Companions in zealous research.'

"The Science Colloquium, the forerunner of our Sigma Xi Chapter, served the very important function of bringing together the members of the various departments of the University, who were interested in research in the fields of pure and applied science. We can now go a step further and recognize the meritorious research work of our younger faculty members, not already members of Sigma Xi, and also that of our advanced students. We will hope to make election to Sigma Xi a coveted honor, by selecting only those whose research fully merits their selection."

Installation Dinner

The installation dinner was held at 6 P.M. at the Wade Park Manor on February 24th, with Professor Wiggers as toastmaster.

The following were present:

I. Honored Guests:

(1) Delegates from other chapters:

Prof. L. J. Cole (Wisconsin), representing Dr. Wilson, President of Sigma Xi
Dean Edw. Ellery (Union), National Secretary
Dean T. M. Focke (Case)
Prof. D. Hooker (Pittsburgh)
Prof. C. H. Kennedy (Ohio State)
Prof. H. B. Lewis (Michigan)

(2) Administrative officers, Western Reserve University:

President-Emeritus Chas. F. Thwing
President R. E. Vinson
Prof. W. G. Leutner, Dean of Administration
Prof. E. J. Benton, Dean of the Graduate School
Mr. S. S. Wilson, Secretary-Treasurer

(3) Administration of Case School of Applied Science:

President Wm. E. Wickenden

II. Guests from other chapters:

(Pittsburgh) Prof. and Mrs. Hance
(Case) F. R. van Horn, G. W. Crile, G. H. Stickney, H. C. Snead, C. R. Steinke
(Brown) H. L. Madison

III. Members of Western Reserve Chapter

President-Emeritus Thwing, President Vinson and Professor Cole made short addresses.

The Evening Meeting

The evening meeting was held in the Allen Memorial Medical Library at 8:15 P.M.

Owing to the absence of Dr. L. B. Wilson, President of the Society, President Wickenden of Case School of Applied Sciences gave an address on "Science in a Changing World." (The address is printed in full in this issue of the QUARTERLY.—ED.)

INSTALLATION OF THE PRINCETON CHAPTER SOCIETY OF THE SIGMA XI

I. The installation meeting was held in the Faculty Room of Nassau Hall, March 19, 1932. Dean Augustus Trowbridge presided. There were 75 members and delegates present. Dean Trowbridge gave a short address of welcome to Princeton and recounted the history of the growth of science in the University.

II. The National President, Dr. L. B. Wilson, Director of the Mayo Research Laboratories of Rochester, Minnesota, then took charge of the meeting. The petition for a chapter signed by 80 members of the faculty of Princeton University and the staff of the Princeton Branch of the Rockefeller Institute for Medical Research was read and Dean Ellery reported formally the favorable action on the Princeton Petition at the National Convention in December, 1931.

III. The following members of the faculty of Princeton and of the staff of the Rockefeller Institute were initiated as members:

Butler, E. G.	McCay, L. W.	Scott, W. B.
Cary, L. R.	McClure, C. F. W.	Seifried, Oskar
Dugan, R. S.	Morris, J. C.	Snelgrove, A. K.
Foster, Wm.	Nelson, J. B.	Ten Broeck, Carl
Heacock, F. A.	Peoples, J. W.	Thom, W. T.
Howell, B. F.	Phillips, A. H.	Trowbridge, Augustus
Hulin, W. S.	Raycroft, J. E.	Wallis, E. S.
Jepson, G. L.	Rouse, J. T.	Wever, E. G.
Little, R. B.	Sampson, Edward	

The following, who had been chosen for membership but who were unavoidably absent from the initiation, will be initiated at some later date:

Alexander, J. W.	Dahlgren, Ulric	Pacsu, Eugene
Alyea, H. N.	Dougherty, G.	Shenstone, A. G.
Anson, M. L.	Harvey, Mrs. Ethel B.	Stevens, K. P.
Bard, Philip	Kunitz, Moses	Zahn, C. T.
Bott, Phyllis A.	Langfeld, H. S.	

In addition those who were members in other chapters now become charter members of the Princeton Chapter as follows:

Anderegg, Fred	Culver, E. P.	Harnwell, G. P.
Beggs, George E.	Dorf, E.	Harvey, E. N.
Brolyer, Cecil R.	Field, R. M.	Hulett, G. A.
Buddington, A. F.	Furman, N. H.	Jones, F. S.
Caley, E. R.	Glaser, R. W.	Krueger, A. P.
Conklin, E. G.	Gowen, J. W.	Lavin, G. I.
Constant, F. H.	Greene, A. M., Jr.	Linford, L. B.

MacClintock, Paul	Robertson, H. P.	Smith, Theobald
Marshall, L. C.	Russell, H. N.	Sorenson, A. E.
Menzies, A. W.	Sandidge, J. R.	Stoll, N. R.
Michels, W. C.	Sarles, M. P.	Swingle, W. W.
Moody, L. F.	Shope, R. E.	Taylor, H. S.
Northrop, J. H.	Shull, G. H.	Turner, L. A.
Pfiffner, J. J.	Sinclair, Wm. J.	Willis, C. H.

IV. The Charter was presented by President Wilson and accepted by Professor Shull.

V. President Wilson addressed the charge to the new chapter. He emphasized the principles of the Society, pointing out its unique character in providing the mechanism for hearing and seeing research in the making.

VI. The following officers were elected:

President, G. H. Shull
Vice-President, E. N. Harvey
Secretary, Paul MacClintock
Treasurer, E. R. Caley

VII. The installation banquet was held at 7:45 P.M. in Procter Hall. President G. H. Shull was in the chair and 69 members and delegates were present.

VIII. President Shull called upon the visiting delegates who presented good wishes from their various chapters, as follows:

Chapter	*Delegate*
Brown	Leonard Carmichael
Columbia	J. W. Barker
Lehigh	Gilbert Doane, Max Peterson
New York University	H. Austin Taylor
Pennsylvania	Charles W. Burr
Rutgers	M. A. Chrysler
Swarthmore	Edward H. Cox
Yale	L. L. Woodruff

IX. The presidential address was given by Dr. L. B. Wilson on "The Cultural Implications of Research in the Sciences."

SCIENCE IN A CHANGING SOCIETY*

W. E. WICKENDEN, PRESIDENT, CASE SCHOOL OF APPLIED SCIENCE

What we call western civilization is a social order based on science and technology, the product of three centuries of the most highly organized effort of the human mind. Man has dwelt on the earth for perhaps a million years, but within the lifetime of men here present he has gained in his mastery over nature more than in all the millenniums which went before. Is the secret of this triumph some element of genius peculiar to the modern mind? It would be flattering to our pride to think so, but probably untrue. Geniuses of the first magnitude have been rare among the moderns. Who in these three centuries dares to measure his stature with a Moses, a Homer, an Alexander, a Plato, a Jesus, a Michael Angelo, or a Shakespeare? The essence of modernity is that progress no longer waits on genius—instead we have learned to put our faith in the organized efforts of ordinary men.

Science is as old as the race, but the effective organization of science is new. Twenty centuries before the Christian era the Chaldeans had learned to predict solar eclipses and to fix the length of the solar year at $365\frac{1}{4}$ days. Pythagoras, about 500 B.C., conceived the earth to be a sphere floating in its atmosphere with no tangible means of support. A century later Philolaus conceived of the revolution of the heavenly bodies and Democritus conjectured the indestructibility of matter and its ultimate subdivision into atoms. In the third century B.C., Aristarchus had undertaken to measure the distances from the earth to the moon and to the sun and had posited the earth's revolution about the latter, to be followed shortly by Eratosthenes who measured the earth's diameter to within a scant fifty miles. Yet none of this knowledge availed to keep Galileo from being haled before the Inquisition under threat of torture.

Hippocrates had laid the foundations of clinical medicine four centuries before Christ, and Aristotle, a half century later, had founded biology on a sure support of observation, classification and induction. So far as modern man is concerned these shining lights of the ancient world serve only to reveal the darkness of seventeen centuries when scientific inquiry lay dormant.

* The installation address at the inauguration of the Western Reserve Chapter, Cleveland, February 24, 1932.

The science of the ancients, like placer mining, was a pursuit of solitary prospectors. Nuggets of truth were found, often in a fairly pure state. It would seem that these nuggets were more often hoarded than milled and stamped into the coinage of common knowledge. More often than not the nuggets were lost or forgotten, waiting more than a millennium to be rediscovered. For long centuries man lost his faith in the orderliness and dependability of nature and put his faith in magic and the black arts. The gold of truth was sought with the philosopher's stone, rather than by the sweat of the miner's brow. Occasionally a prophetic voice, like that of Roger Bacon, came out of the wilderness. Crude invention, like that of printing from type, prepared the way for the spread of knowledge. Alchemy and black art, groping blindly, taught men to experiment. The Protestant revolt taught men to question and to doubt. Then dawned the 17th century, the century of revolution, the century of Harvey, of Kepler, of Galileo, of Francis Bacon and of Newton.

Modern man began to transform his world when he began to mine the hidden veins of knowledge systematically, when he learned not only to recognize the gold of truth in its free state, but to separate the finely dispersed gold from the ore of common experience, by measurement, by experiment, by hypothesis and by verification. Science became powerful when it began to be cumulative, when observers began to preserve detailed records, to organize cooperating groups in order to pool and criticize their experiences. Science became powerful when its gold was no longer hoarded, but milled into the coinage of every-day life, by universal publication and economic use.

Science, too, owes much to the principle of the subdivision of labor. Francis Bacon, who by profession was Lord Chancellor of England, was able to claim all knowledge as his sphere in the 16th century. Effective science began when men made the winning of knowledge their special function or profession. Knowledge multiplied amazingly when an army of specialists began to break it up into ever smaller fragments in order to pursue it more intensively.

Though rich in great names, the annals of science are strikingly devoid of towering figures. Science grows by accumulation rather than by brilliant and unpredictable strokes of genius. Its victories belong to the army of patient investigators rather than to some rare Napoleon. Its ideal is that of removing the hazards of chance from progress. What has been true of the making of science has been true of its

application as well. The face of the earth has been transformed by engineers, yet who can name the geniuses by whom this miracle has been wrought? Let engineering genius be mentioned and the public mind turns instinctively to Watt, Edison, Ford or the Wrights, men who have done dramatic or hazardous work on the superstructure, and forgets the more profound minds which labored on the foundations. The key to the technological revolution—perhaps the chief wonder of our generation—is not in individual wizardry, nor in genius appearing suddenly like a prophet from the wilderness; it is in the capacity which men have developed to work in organized groups, developing their leadership from within.

It is this ideal of progress through cumulative effort, progress by organization, progress which does not wait for some brilliant stroke, some lucky discovery, or the advent of some superman, which is perhaps the chief contribution of science to social philosophy. The very idea of sustained progress, of mankind pressing steadily upward to rising heights, seems to have been alien to the mind of the ancients. Society, it was thought, lived through repeated cycles. Some genius would appear, lift life to a higher level, then disappear, leaving it to decline again to its old commonplaceness. Rise and fall, ebb and flow were inherent in history, but the base line was thought of as fixed and unchanging. The prayer of the ancient world was ever for some genius, some Messiah who might restore its departed glories. This prayer was not for light which all men might share, but for some leader who might guide them through the darkness, always backward to a golden age that had been lost.

The mediæval mind, it would seem, was perhaps a little more favorable to the idea of progress. Mankind might be on the upward grade but it was at best an almost imperceptible slope, made toilsome by the slow workings of trial and error. A certain anthropologist has in his possession two primitive stone implements, one crude in the extreme and the other fashioned with some art. He estimates their difference in age as half a million years. So much for unaided evolution. As an experiment, he took modern boys with no experience in chipping stone and, with only the most primitive materials to work on, taught them in a little more than two hours to chip out implements superior to the best work of prehistoric man. So much for deliberate scientific innovation. Implicit in this episode is the startling contrast between the modern idea of purposed and controlled progress, the mediæval idea of progress by unaided evolution, and the ancient idea of a static

society, moving only in cycles under the alternate spur of genius and lapsing of mankind to its former levels.

To modern science, with its corollary of cumulative progress, we must also credit the growth among men of a psychology of abundance. To the primitive mind, with its instincts rooted in a nomadic existence, and with the hardships of occasional famine and almost continuous want branded on its memory, the notion that the earth could be made to yield an abundance for all its children could seem only fantastic. Stoicism in the face of war and pestilence were natural virtues in an age of want. Charles A. Beard records his vivid impression of the Hindu religion, as a natural expression of the philosophy of a people who have no hope in this or any other world of ever having a square meal. If nature forbids the satisfaction of the most elemental of all desires—the longing for food—what greater boon can be sought than emancipation both from desire and from consciousness of one's self?

The ancient world accepted slavery and aristocracy naturally, as the inevitable consequences of meager resources and scanty production. To me, it has always seemed no mere coincidence that the growth of democratic ideals and institutions has been step by step with the growth of pure and applied science. Democracy is the political and social affirmation of the credo of progress and of faith in man's capacity to produce an abundance for all. The sad dilemma of a world in which millions go hungry while farmers burn their crops, where men go unclothed in the shadow of mills able to turn out three times as many garments or shoes as the people have ever used, where we are troubled with unemployed dollars as much as with unemployed men, all suggests that scientific research and engineering application have accepted eagerly the psychology of abundance, while economics is still largely dominated by the psychology of scarcity.

As the present economic crisis widens and deepens, it seems increasingly clear that it is no mere pause in the march of society, but a prelude to revolutionary changes. As yet there are no signs on our horizon that science will be dethroned or that society will lose its faith in technology as a means of social progress. It is fairly certain, however, that the scientist and the engineer of tomorrow will confront new social ideals and new economic standards. While the results of this revolution are not yet clearly indicated, clues may be discovered in the social trends of today.

The focus of social interest has become economic rather than politi-

cal. The Italian and Russian revolutions reveal this change in extreme forms. Our own political order, based on geographical representation, which served an earlier population of farm owners reasonably well, is showing signs of bankruptcy in an age when men's vital interests divide according to their work, rather than their place of dwelling. The division between political parties has grown indistinct and elections offer a choice of personnel rather than issues. The man of science and the engineer have never been important forces in politics except where special circumstances intervened. If government were to be reorganized on functional lines their public responsibilities would certainly be greatly increased.

Agriculture appears to have reached, for a time, a maximum phase of development and to be entering a phase of decline. Until the turn of the century our agricultural history was written in terms of an unparalleled expansion of acreage and of markets. We spent millions on research in order to make the farmer prosperous by increasing his productivity only to bring him face to face with a blind wall of market limitations. Since that period, agricultural production per capita has diminished, except in war years, while manufacturing has doubled and mineral production increased two and a quarter fold. Farm population has been declining at the rate of a million or more each decade and the mechanization of agriculture bids fair to accelerate the process. Hope of reversing this trend seems to lie in two possible directions—the substitution of agricultural products and by-products for other raw materials used by industry, and a return to a self-contained farm economy based largely on home production and consumption rather than money crops. The one appears only moderately promising, the other unpromising in itself, but likely to develop widely as an adjunct to industrial employment. If technological changes continue to make jobs in industry more and more precarious, some such combination of soil and job is about all that stands between society and a fast-growing proletariat. Electrical power and flexible transport have largely removed the older causes for the extreme concentration of industry in great cities. Industry, commerce and personal service, which in the past have been absorbing fully half of the farm-born population, will apparently receive even larger accessions.

Recent advances in industrial technology have definitely ended our traditional shortage of manpower. This may prove to be a wholly new phase in our national history. If so, the social philosophy which

has dominated our politics, our education and our industry, based on the premises that men are scarce while space and materials are abundant, that society must cherish each individual and develop his powers to the full, that industry must adopt every expedient to "save" labor but could afford to be prodigal with ore, coal, oil, timber, water, soil and other bounties of nature, may undergo radical revision. The incentives which urged on much of our research, have shaped the objectives of invention, have supplied engineers with their criteria of economic selection, and have led us to the unparalleled development of the automatic machine and process in the last three decades, may lose much of their force. Labor surplus, due to mechanical productivity, may swing America nearer to a parallel with western Europe, with its overcrowding of population and shortage of raw materials.

For a time the curve of economic progress appeared to be an expanding spiral. Invention, stimulated by labor shortage and drawing on a vast reserve of scientific knowledge, gave us better machines; machines lowered costs, made improved products possible and thus opened up vast new markets; increased turnover provided new capital and credit for plant expansion; capital in turn subsidized research and stimulated invention; workers were displaced by machines, then reabsorbed into new forms of production and service; tasks became more specialized and craftsmanship declined, wiping out the worker's capital in his skill; the buying power of a day's work rose and created new levels of consumption; advertisers and salesmen stood by with stimulation in hand to revive flagging markets; and the cycle was expected to repeat itself indefinitely on an ever-widening scale.

It now appears that once the magic curve is broken, it is extremely difficult to reestablish the cycle. Possibly it is not a spiral after all. Some of the factors may have been transients rather than constants, and the curve may have an inherent saturation range where machine economy passes into an area of diminishing returns. Technological unemployment may prove to be a cumulative process which not only visits temporary hardships on individuals, but also brings a menacing train of sociological consequences in its wake. What of the mass markets on which mass production depends? What political consequences may come from the rise of a proletariat with no stake in land, or in skill or in permanent employment? What if educational and welfare agencies must make their programs and budgets fit a condition where there will be little employment for youths under 18 and only posts of leadership for adults over 50? Society may with sound

justice insist that the economic burden of labor displacements be reckoned in the costs of production. Engineers contemplating the adoption of labor-saving machinery may have to include some form of social indemnity as part of the cost burden on which a profit must be shown.

Back of the details of engineering economy looms the more profound issue of social utility, which researchers and engineers have never directly faced. In the whole history of research and invention free play to the social consequences has been taken for granted. The doctrine of *laissez faire* assumes a fair balance between technical and moral progress, but many social philosophers now believe that mastery over material forces has greatly outdistanced the accepted moral and legal controls. Certainly none of us can assume that the mechanizing process of the past three decades will continue without check, or that sociological factors may be excluded from the analysis of engineering economy in the future, as in the past. Legal rules change slowly and legislation to meet social changes is subject to trial-and-error adjustments. Meanwhile the safety of society seems to require a type of leadership in science, in industry, and in the technical professions which is highly sensitized on the side of social morals and welfare.

The moving force in the industrial revolution of the last century and a half has been the substitution of machines for muscular labor. While this force is far from exhausted, it appears to have entered a realm of diminishing returns. Thus far the substitution of artificial materials for those more or less directly obtained from nature has been a distinctly secondary factor, but one which lately has begun to assume a commanding importance. If pushed to its limits, however, this second factor can hardly be expected to give to industry as a whole as great a stimulus as that which came from mechanical invention, or from steam and electrical power. It may be sufficient, however, to afford a considerable check on any slowing down process. In any case, chemistry and metallurgy are fairly certain to assume greatly increased importance in every realm of engineering.

As a result of this growing interest in synthetic materials, the deadliest competition of today is not so much between concerns as between products. Research has been made to serve industry as a weapon of attack and of defense. Large concerns, which can distribute their risks over a wide range of products and which can afford heavy expenditures for research, appear to have the best pros-

pects of survival. The entrance of industry into the field of research marks the triumph of a new technique of invention. The philosopher Whitehead points out that what was new and peculiar to the 19th century was its technology. Writing he regards as a greater invention than the steam engine, but one which required a thousand years against a hundred for the engine. In his own words, he asserts that:

> "The greatest invention of the 19th century was the invention of the method of invention. A new method entered into life. In order to understand our epoch, we can neglect all the details of change, such as railways, telegraphs, radios, spinning machines, synthetic dyes. We must concentrate on the method in itself; that is the real novelty which has broken up the foundations of the old civilization."

As a matter of fact much of the earlier history of invention is one of crude practical innovation, followed—and often at long intervals—by the refinements of scientific research. Newcomen, who invented the piston steam engine, was 125 years in advance of Carnot who submitted it to scientific analysis with a view to improving its efficiency. Of late we have begun to reverse the order and to close the gap of time. Faraday was 50 years in advance of Edison, Hertz twenty years in advance of Marconi, and J. J. Thompson's work on conduction in gases scarcely five years in advance of Fleming's 2-element valve—the forerunner of de Forest's 3-element audion on which the modern radio art is based. In the modern industrial laboratory this time lag is tending to disappear entirely. Today's research becomes tomorrow's invention and the day after tomorrow's merchandise. Three decades ago industry had a veritable mountain of unused scientific information at its service. Today that margin has largely disappeared. If invention is to give industry another such impetus in the next three decades our research efforts must be redoubled.

An era of stable rather than increasing population appears to be at hand. The industrial revolution of the last century and a half, together with the advance of medical and sanitary science, greatly stimulated population growth in the western nations. The peoples of the world doubled between 1800 and 1900. With the rise of population and the growth of industry the capital values of all natural resources increased prodigiously. America, being in the midst of her developmental growth, enjoyed this economic stimulant in highly

concentrated form. In the early decades of the last century our population was growing at four times the world rate, and in the late decades at double. The tempo of our agriculture and industry was adjusted to rapidly expanding markets and rising wealth. Just when this growth began to slacken, the world war gave production an immense but temporary impetus, which has complicated the process of readjustment. Land and natural resources show signs of having been heavily overcapitalized. The economic life of America is apparently becoming more nearly parallel to that of Europe where the turnover of trade rather than the unearned increment is the chief source of accumulation. The effect of this change on our national habits of philanthropy is an interesting subject for speculation. Will our educational and welfare institutions continue to enjoy bounties on the scale of the past? Possibly not.

An even more significant influence on education may arise from the changing proportions of the several age groups. An expanding population includes a much greater proportion of young persons than one which has become stable. In 1850 more than half our people were children and youths under 20 and less than one-eleventh were mature adults over 50. The actuarial prospect for 1950 is that barely one-third will be under 20 and practically one-fourth over 50, in short that the ratio of adults over 50 to youths under 20 will have risen fourfold in the century. The sociological consequences are already becoming evident. At the earlier period youth was abundant and maturity scarce, the one at an economic discount and the other at a premium. The age level of life's keenest competition is falling visibly; the decade following adolescence is not likely to be generally available for prolonged training and experimenting with life interests. With the occupational dead-line threatening the middle years, settling down at 30 may entail too great a risk. Young people may have to choose careers earlier and prepare for them more intensively.

If stable population and surplus man-power affect America as they have already affected western Europe, we shall see social strata becoming more permanent, the carrying over of wealth from one generation to another assuming greater importance, a sharper cleavage forming between education for citizenship in general and that for highly intellectual pursuits, greater concern to fit young people efficiently into the economic system, more of education transferred to a continuation period running parallel to early employment, and more of an effort to create and diffuse a national culture concentrated on

the growing leisure of middle and late adulthood. These changes seem to the writer to confirm the wisdom of an educational program which brings the great body of our young engineers into the normal relationships of the industrial world at the age of 22; they also emphasize the need to provide much more generously than in the past for continuation education for graduates.

Democratic capitalism is being challenged for the first time by rival social systems in actual operation. The cardinal principle of capitalism is the belief that society will need more tomorrow than it produces today and can best entrust its surplus wealth to persons who will not consume it, but use it to augment the means of production. For this service incentives are offered and a due reward paid. In an era when both the population and the standard of living were rising rapidly, and especially in a setting of virgin resources and undeveloped continent, this principle has been a great stimulus to individual initiative and thrift. The abuses it entailed were vastly outweighed by its social benefits. Russia, faced by a huge task of industrialization and fearing aggression from without, has been unwilling to trust to the slow and uncertain working of private initiative and in its place has substituted state planning and control. Fascist Italy has invoked the same principle, but in less degree. The issue is not so much one between capitalism and communism, as between the state and the individual, between a nationally planned economy and one based on the doctrine of *laissez faire*.

Examples of a socially wasteful unbalance between producing and consuming power have multiplied in the post-war period in agriculture, mineral production and manufacturing alike. The result has been called a dilemma of thrift. Machine technology, with its seemingly limitless capacity forin creasing production, seems greatly to accentuate this loss of equilibrium. The capital and credit structure built up on producing activities may prove to be larger than the buying power of society can sustain in the presence of forces which tend to diminish the volume of employment available. If so, capital may find it difficult to obtain new outlets and industry may be forced to distribute a larger proportion of its income in forms that directly augment consumption, that is, as wages and cash dividends. Society, too, may deem it expedient to limit the mechanizing of production, rather than to have an unemployable proletariat growing on its hands.

Problems of this character seem to point inevitably to an increasing

degree of social control in economic processes. The engineer of a generation hence will almost certainly be guided by economic premises in which broader conceptions of social expediency will prevail than in the more individualistic past. He may not be an employee of the state, but he is likely to work under a wider range of public regulation. He will be then, as he is now, an economic pragmatist, one who accepts the existing order provisionally and works within it, rather than a doctrinaire seeking to undermine it from within or reshape it from without. If, however, the engineer of tomorrow aspires to be a molding influence in society, he will need a more profound and more critical understanding of social forces than that which sufficed for the engineer of a more individualistic era.

These changes in the social order will probably affect the man of research in somewhat the same order, but in far less degree. Unless society turns deliberately from its faith in progress to re-enter the dark ages, it is inconceivable that scientific inquiry will be dethroned and its freedom denied. Even Russia, immensely preoccupied with its building of a new social system, is apparently more fruitful in research today than under the old régime. Never again shall we see a Lavoisier led to the guillotine, with the derisive sneer of the mob—"The Republic has no need of Scientists!" The urge of profit and production may indeed speed research, and forge it into a competitive weapon, as it is doing in our own generation, but it can never provide the fundamental motives. Deep in the heart of every scientist is the conviction—inarticulate though it may be—of the fundamental validity of his search for the truth of nature. Truth is to him something worth living for, working for, and, if need be, dying for. There is nothing relative, nothing conditional about this conviction. It is simply elemental and intuitive, like the artist's belief in the validity of beauty and the religionist's faith in the sanctity of personality. And now abideth truth, beauty and faith—but who shall say which is the greatest of these?

SOME AIMS AND PROBLEMS OF MODERN BIOLOGY

J. H. Bodine, University of Iowa

It is with considerable hesitancy that the writer attempts, in a few short paragraphs, anything like an adequate analysis of the subject proposed. The following ideas are presented with the hope that perhaps some conception of what biology and modern biologists are deeply concerned with can be conveyed to others not so closely allied to this group.

As time changes, so do the various aspects or ways of approach to the solving or elucidating of fundamental problems, and particularly is this true for those confronting the biologist. The major fundamental issues for the biologist seem to have undergone little, if any, significant changes during the past fifteen to twenty years, while the methods of approach or attack on them have well-nigh exhausted the entire fields of physics, chemistry, mathematics, philosophy, etc., in search of what seems more adequate and exact tools for their solution. Despite these newly acquired or appropriated tools, the biologist is even still far from able to deduce anything like the laws governing the fundamental workings of what we term "living." To be sure, he has been able to gather much additional information concerning these phenomena, but the laws seem still afar off. What seemed, in many instances, almost mature a few years ago has grown tremendously in but a short span of a few years and this growth has indeed been both real and precious. The origin of the new is and will always be the central and irresistible problem of biology. The biologist of today (like the biologist of the future?) is as interested in the ideas of what constitutes a species, how they change, evolution, the relations of body and mind and sundry related problems as were his predecessors.

It would indeed prove futile for the writer to attempt to give anything like an adequate account of the many and varied results or trends in all important fields of modern biological research. An attempt will be made, however, to point out those fields of research which seem to be opening up new viewpoints—new conceptions of the varied and interesting workings of organisms. One must always keep in mind the fact that with our modern intensive experimental methods, in many instances we go far into varied experimental channels

only to as quickly retrace our steps and begin anew in other avenues of approach.

The general problems of the modern biologist are indeed little different from those of his predecessors; in some instances more data and facts are available upon which he can build and speculate and, to be sure, his speculations seem no less intensive or perhaps hazardous than those of earlier generations. To some, perhaps, the borrowing or taking over by the modern experimental biologists of so many of the chemists', physicists' and mathematicians' tools has caused no little consternation and concern. The results ensuing, however, seem sufficiently interesting and important to make such alarm unfounded.

Problems of evolution and genetics, so stimulated in the last decade by the results of the researches of Morgan and others, have gained considerable attention and particularly since renewed interests in the subject have been focused upon the astonishing results of Muller and others who have demonstrated the remarkable effects of X-rays in the production of mutations. Indeed, the fundamental actions and reactions of protoplasm to almost every conceivable type of irradiation have been vigorously investigated during the last few years. The fundamental electrical properties of protoplasm, as well as the responses of organisms to applied potentials, have in theh ands of many investigators yielded no small amount of interesting and important information. Biologists have not only been interested in the better known fields and methods of electrical research but they have even gone so far as to consider the effective influence or action of one substance (organism) at a distance upon another living object. Some would have us believe that by such action at a distance (mitogenic rays) fundamental phenomena as cell division are greatly influenced and disturbed. It has almost become a by-word in the physics and chemistry of biology (biophysics) to point to the remarkable work of A. V. Hill and his associates on the fundamental mechanics and chemistry involved in the seemingly simple process of muscle contraction. Through the ingenuity of these workers, instruments of precision have been devised far more delicate than was dreamed of as possible by older biologists. The fundamental physico-chemical changes in the muscle twitch have been so carefully and minutely analyzed by Hill-Meyerhof and others that today we speak in terms of the conversion of molecules of one type of energy-producing compounds into corresponding molecules or equivalents of other compounds. Never before has it been possible to record with anything like the degree of

accuracy that is being called into action in modern experimental biology. Studies by Warburg and his associates on such fundamental problems as oxidation reduction reactions of protoplasm give us records of details scarcely thought possible but a few years ago.

With an almost overwhelming enthusiasm are efforts being directed toward studies on the chemical or hormone controls or coordinators of the organism and more especially those dealing with questions of sex, reproduction, growth and related phenomena. No longer are there ideas of static, fixed or preformed situations but rather dynamic ones, resultants of the action and interactions of the various chemical coordinators or hormones. Studies on the glands of internal secretion have progressed so rapidly that at the present day they stand close to becoming one of the major fields of experimental biology.

The facts of development (entwicklungsmechanik) have been greatly strengthened by the creative geniuses of Harrison, Speman and their associates. Spatial relations—the action and interaction of developmental units and their peculiar and orderly modes of action—have indeed been greatly elucidated.

The older conceptions of organisms so small as to pass through fine filters—the so-called filterable viruses—no longer hold for the biologist the same degree of remoteness since it has been rather clearly shown that the bacteriophage, these invisible forms of life, are perhaps common—found everywhere—and are one of man's best friends.

It would be quite impossible to enumerate all the many and varied problems of modern biology but it will suffice to say that the future seems to hold in store for the biologist more fascinating, more promising fields for speculative endeavor as the result of modern experimental methods, than it has as yet offered at any periods in man's history. In no field of endeavor has it more rightly been said than of biology that it will advance as far and as fast as it is able to acquire and utilize the tools, both physical and mental, with which to work. Fundamental problems, long since considered insignificant, will develop into those more profitable than man has ever dreamed of realization.

THE ART OF PALEOLITHIC AND NEOLITHIC MAN*

A. AVINOFF

The art of primitive man recedes to a very remote antiquity. We may assume with the great authority on paleolithic culture, Abbé Breuil, that there are some signs of art work ascribed to the Mousterian Period represented by a type of man of lower physical characteristics than the subsequent Aurignacian Era. These earlier examples show a few lines of a presumably decorative nature scratched on pebbles. It is with the Aurignacian Period that the story of representative art of primitive man should start. The late period of the paleolithic era is divided into three main consecutive periods: Aurignacian, Solutrean and Magdalenean. The first and third are closely correlated. The physical properties of man at that time constituted an excellently developed type in no way inferior to modern mankind—perhaps even superior, in some respects, as far as, for instance, the average height is concerned. The brain capacity was also in no way lower than that of modern man. It may be surmised that the Solutrean Period reflects an intrusion of another race which subsequently was partly eliminating or partly dissolved by the Cromagnon man. One should mention perhaps that the latter designation is practically identical with the Aurignacian man whose crowning attainments developed in the Magdalenean Period. These periods in pre-history are territorially confined to Northern Spain and Southwestern France. Magdalenean art in these two countries is characterized by the numerous paintings, carvings and line drawings incised in bone and stone found in the caves of Altamira and Dordogne. For the purpose of preserving the essential features of a survey of early art one should indicate the properties of the Capsian art, the name being derived from a place in Tunis and showing similarity of style both in Northern Africa and Southern Spain. The most important marks of the Capsian art are connected with a rather complex composition of pictures showing hunting scenes, groups of people, etc. It may be called the earliest example of what the French designate under the term of Genre. The animal forms are far from

* Résumé of a lecture delivered before the Pittsburgh Chapter, November, 1931, being one of a series of public lectures arranged by the Chapter on "The Culture of Prehistoric Man."

being so carefully and precisely drawn as those which adorn the walls and ceilings of the Spanish and French caves, but in no other prehistoric art do we find such a number of examples of human figures which are particularly interesting both from the point of view of the dresses of the women and the bows of hunters. There is a striking similarity between Capsian art and that of the pre-historic Bushmen in South Africa which is attributed by some scholars to an age of fifty thousand years before our era.

The Solutrean Age was not preoccupied by any naturalistic representation typical of Aurignacian and Magdalenean periods. It is known best by the workmanship of very carefully executed flint implements. The perfection in the preparation of these flint objects classes them in a sense among the products of art since the aesthetic value is quite apparent in the grace and regularity of the curves.

The Magdalenean art is known for the extraordinary ability exhibited in the painting and modeling of animals contemporary with early man. So are portrayed the Woolly Rhinoceros, the Mammoth, the Cave Bear, and some kind of feline—all of these animals belonging to a long extinct stock testifying to the remote times of these paintings in the caves. Touching upon chronology one may say that it would be safe to assign to the Aurignacian Age an antiquity of some twenty thousand years, whereas the Magdalenean Age may have occurred some ten thousand to fifteen thousand years ago. Proceeding with the enumeration of the animals outlined by these early artists we should mention the deer, the reindeer, the wild boar, certain species of gazelles and chamois, the horse and last, but not least, the European bison. The latter animal, called sometimes the "wiesent," a close relative of its American cousin, is now confined to a certain portion of the Caucasus since it was exterminated during the War in the Polish forests. The wiesent is glorified in a set of multitudinous portrayals showing this animal in every aspect. The Caves of Altamira are especially celebrated for their numerous galleries representing hundreds of bisons which are partly in relief, but in a great majority of cases are executed in polychrome painting. The variety of colors was attained by pigments derived from natural earths. The usual colors were yellow ochre, reddish clay of different tints, and the black soot produced by some primitive torches. In some cases the black color was obtained from oxide of manganese which proved more suitable than lampblack.

One can distinguish four periods in the ways of depicting animals

by paleolithic artists. In the beginning they were outlined exclusively in contours incised in the stone. Later on faint lines in engraving were indicated in order to accentuate the difference of shading and texture. At a still later period the figures were painted in solid monochrome, usually black or red. It is only in the late Magdalenean period that the full polychrome painting reaches its apogee. At that time some remarkable pieces of animal painting were produced which can be classed in a due sense among great periods in the history of art. The skill and expressiveness of this animal portraiture can be compared only with some of the examples of Assyrian and Japanese art. In this manner the aspect of many animals contemporaneous with early man was faithfully preserved. Although these images indicate an obvious trend toward a certain idealization, this tendency alone is a matter of distinct interest which throws some light on the psychology of the early artists. With the close of the Magdalenean period all the art of animal painting rapidly deteriorated. In the so-called Azilian time, but few animal figures are produced and the main artistic decoration is reduced to geometrical ornaments constituting the most characteristic trait of the subsequent neolithic art. It may be mentioned that the human figure interested only the paleolithic artist to a moderate degree. His full attention was drawn to the representation of the animal. Some crude figures of human beings are known as well as bas-reliefs of figures showing men and women. There are several theories concerning the significance of the numerous animal paintings found in the caves of France and Spain. According to one of these hypotheses the aim in drawing these figures was of a magical order, being connected with some crude form of religion and propitiation. Others envisage these paintings as being an expression exclusively of a natural aesthetic impulse. It would be difficult to settle this question within the present scope of our knowledge about this phase of early culture. The most important compendium of paleolithic art is contained in the volumes of Abbé Breuil, published by the Prince of Monaco. The Abbé was responsible for making a meticulously careful study of all the paleolithic monuments preserved on the walls of the numerous caves he examined. Many of these paintings have been since disfigured by the inscriptions of tourists who flock to these recesses which preserved intact the paintings of the early man for over 20,000 years. From the beginning of the Neolithic Age throughout to the Bronze and Iron Age, we see the development of other sides of human culture

and the representation of nature is more or less forgotten. It is chiefly the practical problems concerning the early human community that form the most important preoccupations of our ancestors of that period. The decoration is restricted to pottery which started to be developed at that time. Such examples are scattered in a great many places of Europe and Asia. It is only in the later times of the Neolithic Age that natural forms begin to be treated again as artistic motives, but their interpretation has never reached the height which was attained by the obscure paleolithic artists on the dawn of mankind.

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE, WASHINGTON, APRIL 25, 1932

The regular spring meeting of the Executive Committee was held April 25, 1932, at the Cosmos Club, Washington. The meeting was called to order by President Wilson at 10:00 A.M. Present were: President Wilson, Secretary Ellery, Treasurer Pegram, Professor Leuschner, Professor Lloyd, Professor True, Professor Cole, Mr. Sweet and, by invitation, Mr. Knight of the Alumni Committee, Dr. Roos, Secretary of the A. A. A. S., Dr. Bogue, President of the District of Columbia Chapter, Dean Richtmyer, past-president of the national society.

The following items of business were discussed, and actions were taken as indicated:

1. THE SEMI-CENTENNIAL:

The Semi-centennial of the society occurs in 1936. The sub-committee of the Executive Committee (Ellery, Stewart, Whitney, Pegram, Davies, Baitsell) appointed at the meeting of the Executive Committee in Washington, April 28, 1930, reported that it had received suggestions from the Cornell Chapter that the Semi-centennial be celebrated in Ithaca in the summer of 1936, in connection with the Rochester meeting of the A. A. A. S., scheduled for that time; and further, that it was favorable to the suggestion. Dean Richtmyer, speaking for the Cornell Chapter and for the Provost of Cornell University, presented an invitation to the Society to come to Cornell at that time. Dr. Roos, speaking for the Executive Committee of the A. A. A. S., stated that the Committee favored the plan to make the Semi-centennial a part of the program of the Rochester meeting and was prepared to assign one day of the convention week for the celebration.

Many suggestions were made by members of the Executive Committee regarding the content of the Semi-centennial program, the most appropriate time of the month, and the best day of the Association convention week for the event. After full discussion, it was

Voted—(a) That the Executive Committee recommend to the convention that the invitation from the Cornell Chapter and Cornell

University to hold the Semi-centennial celebration in Ithaca in the summer of 1936 be accepted.

(b) That the exact time of the month of June and the exact day of the week for the celebration be left for decision to the Executive Committee of the A. A. A. S., the Cornell Chapter and Cornell University, and the Executive Committee of Sigma Xi.

(c) That a national committee on the celebration, consisting of a representative of each chapter chosen by the chapter, be appointed at once, to work with the sub-committee in perfecting the arrangements for the celebration.

(d) That a tentative program for the celebration be submitted to the consideration of the Executive Committee at its spring meeting, 1933.

2. SIGMA XI AWARD FOR RESEARCH:

The Secretary presented a proposal that the income from the invested funds of the Society be used for an annual award in recognition of research, the first award to be made at the time of the Semi-centennial.

The Treasurer stated that at present the invested funds amounted to $17,906.25 (securities carried on his accounts at cost) and that possibly in 1936 the fund would amount to $20,000.

Many suggestions were made regarding the form such an award might take, but no decision was made or attempted. The discussion indicated that the Committee felt it would not be wise to commit the Society at this time to the use of the income from invested funds to an annual award for research. It was finally

Voted—That it is desirable that from now on the income from the invested funds of the Society be segregated for use in direct recognition or promotion of research, and that such use begin in the form of an award at the time of the Semi-centennial celebration in 1936.

3. COMMITTEE ON AWARD OF GRANTS-IN-AID OF RESEARCH:

The Secretary called the attention of the Committee to the personnel of the present committee on award (Whitney, Calkins, Shapley) and stated that probably Dr. Whitney would not be able to serve this year. It was

Voted—That Professor Harned of Yale be asked to serve as a temporary substitute for Dr. Whitney.

4. Amount of Fund to Be Distributed for Grants-in-Aid of Research:

Upon motion of Treasurer Pegram, it was

Voted—That an amount not to exceed $2500 be authorized for grants-in-aid of research for 1932–33.

5. Annual Letter to Alumni:

The Secretary called the attention of the Committee to the letters sent to alumni in 1930 and 1931, and asked for suggestions regarding a letter for the current year. It was

Voted—That Mr. Sweet, chairman of the alumni committee, be asked to formulate the annual letter to the alumni for 1932, and that members of the Committee make suggestions to Mr. Sweet regarding the content of the letter.

6. The 1933 Convention:

In view of the fact that special emphasis is to be given to the summer meeting of the A. A. A. S. in Chicago in 1933 and that many foreign scientists are expected to be present at that time, and in response to a direct invitation from the Committee on Arrangements of that meeting, it was

Voted—To recommend to the convention that Sigma Xi hold its convention for 1933 in connection with the summer meeting of the A. A. A. S., instead of in December.

7. Proposal from the District of Columbia Chapter:

Dr. Bogue, president of the District of Columbia Alumni Chapter, presented to the Committee a suggestion from the Chapter that the Chapter be empowered to cooperate with the educational institutions located in Washington, and to select from students in such institutions a few outstanding individuals for election as associates in the Chapter. Dr. Bogue proposed as a basis for such election that the individual should have accomplished some research work worthy of recognition by the Society, should have published something connected with the research work done, and should at the time of his election be actually engaged in research work.

There was full and appreciative discussion of the proposal on the part of all members of the Committee. The Secretary was directed to express to Dr. Bogue and to the Chapter the appreciation of the

Committee of the high standards of election as proposed by the Chapter, and to inform the Chapter that the Society at its next convention was to consider a proposed amendment to the constitution by which the Executive Committee would be given authority to elect as associates of the Society, in institutions where there are no chapters, students who have shown marked promise of research ability. It was

Voted—That the proposal of the District of Columbia Alumni Chapter regarding election as associates of students from educational institutions be referred for study to the committee on conservation of research talent and be made a special order of business at the spring meeting in 1933.

8. INVITATION TO MEET IN MILWAUKEE:

The Secretary presented an invitation from the Chamber of Commerce of Milwaukee to hold a convention in that city at some time in the future. It was

Voted—That the Secretary be instructed to reply that Sigma Xi conventions are held in connection with the annual meetings of the A. A. A. S., and that if the latter selected Milwaukee as a future meeting place Sigma Xi would probably hold its convention there at the same time.

9. INFORMAL PETITIONS FOR CHAPTERS AND INQUIRIES:

A. George Washington University:

A group of Sigma Xi members and associates at George Washington University, functioning as a Sigma Xi Club, presented information about the resources and equipment of the institution, with the end in view of presenting sometime in the future a petition for a charter for a chapter.

After full consideration it was

Voted—That official visitors be appointed to visit the George Washington University and report at the next meeting of the Committee.

The president appointed Professor Pegram and Professor True as such visitors.

B. University of California at Los Angeles:

The report of the official visitor to the University of California at Los Angeles (Dr. Durand, Leland Stanford) was presented. This was supplemented by a statement from Professor Leuschner regarding

the relations of the northern and southern branches of the University of California, and by a report of a special meeting of the California Chapter on March 30, 1932, to consider the informal petition for a charter for a chapter which had been presented by the group of members at the southern branch. It was

Voted—That the group of Sigma Xi members and associates at the University of California at Los Angeles be invited to present a formal printed petition for the December meeting of the Committee.

10. Convention Speaker:

Members of the Committee suggested the following as possible lecturers at the Convention in Atlantic City:

Ruthven (Michigan)
Hubble (Mt. Wilson Observatory)
C. K. Leith (Wisconsin)
Coleman (Toronto)
Muller (Texas)

11. Life Members:

At the 1931 convention the Cornell and Michigan Chapters presented a proposed amendment to the constitution, creating an additional class of members to be known as "Life Members." The convention referred the proposal to the Executive Committee for consideration and for report to the 1932 convention.

The Committee discussed the proposal fully and expressed its opinion that:

(a) The term "Life Members" was inappropriate, since all members of Sigma Xi are members for life;

(b) Members of Sigma Xi do not pay dues to the national organization;

(c) It is within the province of a chapter to honor any of the chapter's members by an exemption from payment of chapter dues, if the chapter so wishes;

(d) The designation of "Retired Member" was indicated as appropriate for those of its members whom a chapter desired to honor.

12. What Is a "Neighboring Chapter?"

The Secretary presented a letter from the Minnesota Chapter regarding the possibility of an election by it of a member of the faculty

of the Montana State College. The Secretary was instructed to reply that the individual named could be elected by the chapter at the institution of which the individual is an alumnus, if there is a chapter there; or, failing that, by a chapter more clearly "neighboring" to Montana than the Minnesota Chapter.

13. DISCREPANCY IN STATEMENTS IN CONSTITUTION:

A. The present charter for chapters limits election of undergraduates in an institution in which new chapters are created to the status of an associate. The constitution provides for the election as members of "any student" who meets the conditions prescribed. It was

Voted—That in new reprints of the constitution a note should be added calling attention to the fact that in all chapters organized since 1922 (the date of the adoption of the present constitution) election of undergraduates is limited to associateship.

B. A letter from the Wisconsin Chapter called attention to an apparent discrepancy in the constitution between Section 6b of Article III and Section 3a of the Constitution.

Section 6b refers to an individual connected with an educational, scientific or professional institution not having a chapter who would otherwise be eligible for membership on conditions prescribed in Section 3a. Section 3a limits election to membership of the staff of the institution where there is a chapter.

The Secretary was instructed to reply that the use of the word "otherwise" in Section 6b removes a possible misinterpretation of the constitutional requirements for election as alumnus member. An individual who has shown noteworthy achievement as an original investigator in an institution not having a chapter may be elected to membership by a neighboring chapter just as the same individual would be eligible for membership if connected with the institution which has a chapter.

14. QUALIFICATIONS OF ASSOCIATES:

The Secretary presented a letter from the Lehigh Chapter calling attention to the fact that in the qualifications of associates as given by the constitution there is no mention of research ability, and asking if the Lehigh Chapter were within its rights if it added to the constitutional qualifications for associates "promise of research ability." The Secretary was instructed to reply that the constitutional defini-

tion of eligibility as associate presented "minimum requirements;" chapters may add to those requirements as local conditions may make desirable.

In this connection a letter from the Washington State Chapter was presented requesting the Executive Committee or the Convention to define in more detail eligibility requirements for election as members and associates, in order to secure greater uniformity of standards among the chapters. The Secretary was instructed to reply that in the judgment of the Committee it is not desirable to define eligibility in too great detail, and that in view of many differences in local conditions at various institutions where chapters exist, exact uniformity of standards for election is probably not possible.

15. Relation of Clubs to the National Organization:

The Sigma Xi Club of the University of Florida asked consideration of the following proposals, in order to bring about closer affiliation of clubs to the National Society:

Clubs numbering 20 or more members should be given:

(a) The privilege of voting on all questions at the annual conventions;

(b) The privilege of nominating national officers;

(c) The privilege of electing undergraduates to associateship.

The Committee gave full and sympathetic consideration to the proposals and instructed the Secretary to reply that

(a) The business of the Society and the conduct of the Society's affairs are by the terms of the constitution chapter responsibilities, delegated by them to their representatives at the convention;

(b) Clubs already are privileged to suggest candidates for national offices to the Committee on Nominations appointed by the president and published 90 days prior to the Convention;

(c) The 1932 Convention will consider a proposal made by the Committee on Conservation of Research Talent, whereby undergraduates at institutions in which there are no chapters, who show promise of research ability, may be elected as associates by the Executive Committee.

16. How Much Time May Elapse between Election and Initiation to Membership or Associateship?

The Brown Chapter presented a case on which it asked the opinion

of the Executive Committee. The individual was elected to membership in 1912; for some reason, not definitely known by the present chapter, initiation did not follow; the individual, who has not been engaged in scientific work in the years that have elapsed, requests initiation at the present time on the basis of the election in 1912.

The Committee expressed its judgment that since the constitution sets no time limit for initiation after election, but definitely provides that a member-elect who is unavoidably prevented from being present at a regularly appointed time for initiation may be initiated as the chapter may provide; and further, that since it had no definite information as to the reasons why the individual was not initiated at the appointed time, the question of initiation at this time of the individual concerned is one which the chapter itself can best decide.

Some members of the Executive Committee thought the constitution should set a time limit for initiation after election, but in view of the fact that this was the first instance of the kind to come to the knowledge of the national officers who have been connected with the Society for many years, the Committee decided to take no action on the matter.

17. INSTALLATIONS:

Professor Cole reported the installation of the Western Reserve Chapter.

Dr. Wilson reported the installation of the Princeton Chapter.

18. EXEMPTION OF ALUMNI CHAPTERS FROM ANNUAL ASSESSMENTS:

Professor Pegram brought up the action of the Executive Committee in 1925, which was as follows:

> "*Voted*—That the annual assessment levied by the Convention be applicable to institutional chapters only, and the Treasurer be authorized to adjust the records to this motion."

After discussion it was

Voted—To interpret the action of the Committee in May, 1925, as waiving or remitting dues to the District of Columbia Chapter to assist it in getting organized; that such action remain in effect during 1932; that the Secretary inform the District of Columbia Chapter of this interpretation of the vote of the Committee in 1925.

19. BUDGET FOR 1932:

Professor Pegram presented the following budget for the current year:

QUARTERLY	$2200
Secretary's Office	4400
Treasurer's Office	200
Officers' Traveling Expenses	1200
Engraving Charters	120
Total	$8120

It was

Voted—That the budget be adopted as presented.

20. ADJOURNMENT:

The meeting was adjourned at 6:10 P.M.

EDWARD ELLERY, *Secretary*

LIST OF MISSING PERSONS

Can You Help Us Locate These Members?

Name	*Chapter*	*Last Known Address*
Evans, Florence L.	Ill. 1929, 1931	360 Chemistry Bldg., Univ. of Illinois, Urbana, Ill.
Evans, Gilbert Holman	Penn. 1917	273 Clarkson St., or 806 N. 41st St., Brooklyn, N. Y.
Evans, John Harwood	Ill. 1931	Entomology Bldg., Univ. of Illinois, Urbana, Ill.
Evans, Otty Blair	McGill 1923	
Evans, Pansy Alice	Chicago 1923	816 Belvidere, Salt Lake City, Utah
Evans, Robert James	Cornell 1912	Logan, Utah
Evans, Theodore	U. of Wash. 1930	4538—15th St., N. W., Seattle, Wash.
Evans, Tringad Knight	Union 1905	
Evenson, Franklin Fenelon	Stanford 1921	4225 Ingleside Ave., San Diego, Calif.
Evjen, Haakon Muus	Cornell 1926 C. I. T. 1927	Calif. Inst. of Technology, Pasadena, Calif.
Ewers, Lela Arminda	Ohio 1929	Dept. of Zoology, Ohio State Univ., Columbus, Ohio
Ewing, Frederick, Jr.	C. I. T. 1926–1928	Calif. Inst. of Technology, Pasadena, Calif.
Fagan, Leo Bernard	I. S. C. 1929	Dept. of Psychology, Univ. of Iowa, Iowa City, Iowa
Fahnestock, Margaret J.	Northwestern 1927	Sioux Falls College, Sioux Falls, N. D.
Fahrner, Homer	Calif. 1923	552 "B" St., Santa Rosa, Calif.
Faith, Willard Vanamber	McGill 1924	
Fallis, Annie L.	U. of Wash. 1919	Asst. City Bacteriologist, Pasadena, Calif.
Farquhar, Silas Edgar	Ill. 1913	McPherson Ave., St. Louis, Mo.
Farr, C.	Columbia 1914	
Faulwetter, Roy C.	Columbia 1915	
Faust, Homer Morgan	Ohio 1923	Box 33, Youngstown, O.
Favor, Ernest H.	Mo. 1905	Expt. Station, Univ. of Missouri, Columbia, Mo.
Fecker, James W.	Case 1912	7612 Linwood Ave., Cleveland, Ohio
Federick, Joseph C.	Renss. 1929	174 Harrison Ave., Jersey City, N. J.
Federighi, Hervay	Rutgers 1923	
Feirer, William A.	J. H. U. 1925	Johns Hopkins University, Baltimore, Md.
Felchlin, R. F.	Calif. 1912	633—34th St., Oakland, Calif.
Feldman, Earl R.	Purdue 1922	Room 126, State House, Indianapolis, Ind.

Name	*Chapter*	*Last Known Address*
Feldstein, Matthew M.	Chicago 1922	1223 E. 57th St., Chicago, Ill.
Fenwick, Florence	Mich. 1917, Yale	314 Humphrey St., New Haven, Conn.
Ferebee, Alan McPherson	Renss. 1904	Travaux Publiques, 16 Rue de la Pepiniere, Paris, France
Fernald, Grace Maxwell	Chicago 1906	1311 McCullum St., Los Angeles, Calif.
Ferris, Lawraine Osborn	Ill. 1925	Chemistry Bldg., Univ. of Illinois, Urbana, Ill.
Fetters, George W.	Calif. 1931	Elk Grove, Calif.
Fettke, Margaret	U. of Wash. 1914	1434 West 22nd St., Los Angeles, Calif.
Feugarde, Kathleen	Calif. 1927	2713 Haste St., Berkeley, Calif.
Fidlar, Edward	Minn. 1909	Inst. of Public Health, Western University, London, Ont., Canada
Field, Dayton	Ill. 1923	R. F. D. 3, Elkhorn, Wis.
Field, Nelle	Ill. 1929	205 Michigan Ave., Urbana, Ill.
Fields, Florence G. L.	Ill. 1931	Natural History Bldg., Univ. of Illinois, Urbana, Ill.
Fieser, Arthur J. S.	Ind. 1926	5520-A Ellis Ave., Chicago, Ill.
Fife, James M.	Ames 1927	2713 Boone St., Ames, Iowa
Finical, Thomas N.	Ohio 1922	2047 Richland Ave., Lakewood, Ohio
Finke, Wilbur H.	Minn. 1910	
Finkle, Philip	Calif. 1923	Univ. of California, Berkeley, Calif.
Finley, Frederick Lovell	McGill	
Finney, John H. Vance	Colo. 1917	Univ. of Colorado, Boulder, Colo.
Firth, Joseph	Renss. 1901	Carr & McFadden Co., West Palm Beach, Fla.
Fischer, Edward F.	Mich. 1930	730 Arbor St., Ann Arbor, Mich.
Fish, Gilbert D.	Columbia 1913	3519 Lowell St., Washington, D. C.
Fisher, Forest Addison	Ill. 1911	Durley Bldg., Bloomington, Ill.
Fisher, Harold S.	Calif. 1919	
Fisher, Richard Stoner	Ill. 1922	111 Gleane St., Elmhurst, L. I., N. Y.
Fisk, Walter Warner	Cornell	
Fitch, Mary	Missouri 1906	William Woods College, Fulton, Mo.
Fitch, Ruby	Missouri 1905	Springfield High School, Springfield, Mo.
Flanders, Donald A.	Pa. 1924, 1928	9 Aiken Road, Princeton, N. J.
Fleer, Emma A. M.	Chicago 1924	5514 Blackstone Ave., Chicago, Ill.
Fleeson, Elizabeth	Kansas 1915	1175 Chappel St., New Haven, Conn.

CHAPTER OFFICERS

LIST FURNISHED BY THE SECRETARIES OF THE CHAPTERS

CHAPTER	PRESIDENT	VICE-PRES.	SECRETARY	TREASURER
Cornell	Robert Matheson	L. A. Maynard	G. E. Grantham	A. J. Heinicke
Rensselaer	F. W. Schwartz	E. B. Allen	F. M. Sebast...	H. E. Stevens
Union	J. W. Mavor	D. S. Morse	C. B. Hurd	C. B. Hurd
Kansas	H. H. Lane	C. M. Young	E. L. Treece	H. E. Jordan
Yale	I. V. Hiscock	L. E. Seeley	R. K. Warner	R. D. Coghill
Minnesota	D. G. Paterson	G. O. Burr	F. B. Hutt	Alice Biester
Nebraska	B. C. Hendricks	T. A. Kiesselbach	E. N. Anderson	M. G. Gaba
Ohio	J. F. Lyman	E. M. Spieker	F. A. Hitchcock	F. A. Hitchcock
Pennsylvania	E. B. Twitmyer	H. C. Bazett	H. S. Oberly	W. W. Lucasse
Brown	A. A. Bennett	R. B. Lindsay	G. L. Church	W. R. Benford
Iowa	J. H. Bodine	J. A. Eldridge	A. C. Tester	Roscoe Woods
Stanford	G. J. Pierce	J. W. McBain	C. P. Stone	C. P. Stone
California	T. H. Goodspeed	E. O. Lawrence	G. E. Troxell	S. F. Cook
Columbia	D. E. Lancefield	J. S. Morgan	G. M. Kay	G. M. Kay
Chicago	E. S. Bastin	E. J. Kraus	W. Bartky	J. B. Hoag
Michigan	A. H. White	E. H. Kraus	O. F. Duffendack	S. S. Atwood
Illinois	F. L. Stevens	H. Woodrow	R. F. Paton	R. C. Fuson
Case	W. E. Wickenden	C. Nusbaum	K. H. Donaldson	T. M. Focke
Indiana	D. A. Rothrock	J. M. Van Hook	E. L. Yeager	P. Weatherwax
Missouri	L. J. Stadler	M. P. Neal	H. E. Hammond	G. F. Breckenridge
Colorado	M. H. Rees	K. Muenzinger	H. B. Van Valkenburgh	W. K. Nelson
Northwestern	L. B. Arey	M. A. Hines	H. B. Ward	M. Carlson
Syracuse	H. Essex	A. D. Campbell	D. P. Randall	R. R. Hirt
Wisconsin	F. Daniels	J. Stebbins	J. B. Kommers	H. R. Aldrich
Univ. of Wash.	G. E. Goodspeed	E. A. Loew	C. L. Utterback	F. B. Farquharson
Worcester	H. H. Newell	K. G. Merriam	W. E. Lawton	W. L. Phinney
Purdue	H. E. Enders	L. V. Ludy	R. H. George	Marguerite Mallon
Washington University	G. E. M. Jauncey	F. W. Bubb	W. D. Shipton	R. R. Tucker
District of Columbia	R. H. Bogue	Wm. Bowie	Miss Vinnie Pease	Wm. Lerch
Texas	C. P. Boner	F. M. Bullard	M. Y. Colby	H. R. Henze
Mayo Foundation	E. S. Judd	A. E. Osterberg	J. L. Bollman	J. L. Bollman
N. Carolina	A. S. Wheeler	E. T. Browne	E. L. Mackie	E. L. Mackie
N. Dakota	J. L. Hundley	L. C. Harrington	R. C. Staley	R. C. Staley
Iowa State College (formerly *Ames*)	B. W. Hammer	J. W. Woodrow	J. L. Lush	H. E. Biester
Rutgers	W. H. Cole	H. E. Starr	R. d'E. Atkinson	M. A. Chrysler
McGill	W. G. McBride	J. B. Collip J. J. O'Neill	D. L. Thomson	C. L. Huskins
Kentucky	F. E. Tuttle	H. H. Downing	E. M. Johnson	J. S. McHargue
Idaho	L. C. Cady	Ella Woods	W. H. Cone	A. M. Sowder

CHAPTER OFFICERS (*Continued*)

LIST FURNISHED BY THE SECRETARIES OF THE CHAPTERS

CHAPTER	PRESIDENT	VICE-PRES.	SECRETARY	TREASURER
Swarthmore	H. J. Creighton.	L. Fussell.	E. H. Cox.	E. H. Cox
Oregon	R. H. Seashore.	G. E. Burget.	R. R. Huestis.	W. D. Wilkinson
Virginia	L. T. Royster.	J. K. Roberts.	J. E. Kindred.	J. E. Kindred
Johns Hopkins	A. H. Pfund.	A. M. Chesney.	M. W. Pullen.	F. D. Murnaghan
Calif. Institute of Technology	J. A. Anderson.	R. R. Martel.	W. R. Smythe.	R. T. Knapp
New York	R. T. Cox.	B. G. Smith.	H. G. Lindwall.	H. G. Lindwall
Cincinnati	W. Bucher.	R. E. Oesper.	S. B. Arenson.	S. B. Arenson
Mich. State	E. A. Bessey.	C. H. Spurway.	E. E. Down.	R. E. Marshall
Arizona	G. E. Davis.	E. H. Warner.	E. L. Scott.	E. L. Scott
Lehigh	T. Fort.	G. E. Doan.	M. Petersen.	C. D. Jensen
Maryland	A. F. Woods.	C. G. Eichlin.	M. M. Haring.	M. M. Haring
Kansas State	J. E. Ackert.	G. A. Dean.	C. W. Colver.	J. L. Hall
Col. of Medicine, Univ. of Illinois	R. H. Jaffe.	A. G. Cole.	W. H. Welker.	I. Pilot
Pennsylvania State	R. L. Sackett.	D. C. Duncan.	D.F.McFarland	J. E. DeCamp
Oklahoma	. B. Hoisington.	Bruce Houston.	L.E.Swearingen	L.E. Swearingen
State College of Wash.	V. Burke.	H. V. Carpenter	J. L. St. John.	J. L. St. John
Wyoming	P. F. Hammond	E. R. Schierz.	Carl S. Gilbert	Carl S. Gilbert
Rochester	J. R. Murlin.	Wm. Berry.	Q. D. Singewald	Q. D. Singewald
Pittsburgh	D. Hooker.	O. E. Jennings	R. T. Hance.	O.H. Blackwood
Harvard	Harlow Shapley	Hans Zinsser.	K. F. Mather.	D.H. McLaughlin
Western Reserve	V. C. Myers.	H. S. Booth.	J. A. Doull.	A. H. Hersh
Princeton	G. H. Shull.	E. N. Harvey.	P. MacClintock	E. R. Caley

SIGMA XI CLUBS

CLUB	PRESIDENT	VICE-PRES.	SECRETARY	TREASURER
Southern California	W. A. Hilton	.....	B. Richardson	B. Richardson
Carleton College	M. B. White	A. M. Holmquist	H. P. Klug	H. P. Klug
University of Denver	T. R. Garth	.....	E. A. Engle	E. A. Engle
Oregon State Agricultural College	H. R. Laslett	.....	J. E. Simmons	J. E. Simmons
West Virginia University	C. R. Orton	G. S. Dodds	C. N. Reynolds	C. N. Reynolds
University of Maine	W. F. Dove	M. Freeman	M. D. Sweetman	M. D. Sweetman
University of Florida	A. A. Bless	Fred H. Hull	V. B. Christensen	V. B. Christensen
Colorado Agricultural College	D. W. Robertson	.....	J. Pinsky	J. Pinsky
University of So. Dakota	E. P. Rothrock	.....	.....	.....
Louisiana State Univ.	E. C. Timms	A. D. McKinley	W. Whitcomb	W. Whitcomb
University of Alabama	E. B. Cormichael	T. E. Hunt	J. L. Kasner	G. I. Adams
University of Arkansas	H. M. Hosford	.....	Z. C. Battey	Z. C. Battey
University of California at Davis	T. I. Storer	.....	E. L. Proebsting	E. L. Proebsting
University of Utah	Elton Quinn	I. B. Burns	T. C. Adams	.....
Clark University	R. H. Goddard	.....	P. M. Roope	P. M. Roope
St. Louis University	V. T. Allen	L. F. Yntema	W. H. Griffith	.....
Connecticut Agr. College	F. A. Ferguson	W. L. Kulp	W. N. Plastridge	W. N. Plastridge
Miami Univ.	Clarence Kreger	.....	B. M. Davis	.....
Univ. of Ga.	A. S. Edwards	.....	M. W. Lowry	.....
Bucknell University	W. H. Stewart	.....	J. S. Gold	J. S. Gold
Duke Univ.	W. W. Nielson	.....	Julia Dale	.....
Buffalo	R. R. Humphrey	.....	W. J. Atwell	J. O. Ralls
Oklahoma A. and M. College	J. A. Burrows	E. F. Allen	J. E. Webster	J. E. Webster
Univ. of Calif. at Los Angeles	S. J. Barnett	.....	F. C. Leonard	.....
Montana State College	W. McK. Martin	J. A. Nelson	Jessie Richardson	Jessie Richardson
North Dakota Agr. College	L. R. Waldron	D. S. Dedrick	C. I. Nelson	C. I. Nelson
Texas Tech. College	F. W. Sparks	G. W. Woodbury	W. L. Ray	.....
University of Montana	F. O. Smith	G. D. Shallenberger	Esther L. Larsen	.....
Virginia Polytechnic Inst.	P. C. Scherer	.....	.....	.....
Peking, China	W. H. Adolph	Y. C. Mei	A. P. T. Sah	A. P. T. Sah

OFFICIAL ANNOUNCEMENTS

All insignia of the Society are available only through the office of the national secretary. Orders for these insignia are issued through chapter secretaries, and must be **prepaid.** Information about styles and prices may be obtained from chapter secretaries or the national secretary.

PRINTED BLANKS

The General Convention has instructed the secretary to forward to chapters under the following stipulations:

Membership Certificates, stamped with the great seal of the Society. In packages of fifty prepaid, on advance payment of $2.50 for each package. Please specify carefully whether for active or associate members.

Index Cards, for members and associates. *Gratis.*

Chapter secretaries are requested to fill out these cards carefully, giving PERMANENT addresses of the members, and return to the national secretary.

A few copies of the Quarter Century Record are available at $2.50, O. B. C., each.

Copies of the Constitution are available at 9 cents each.

SIGMA XI BANNERS

Chapters may obtain Sigma Xi Banners at the following prices:

Size 3 x 5—$ 8.00
4 x 6— 12.00
5 x 8— 20.00

CHANGES OF ADDRESS

All changes of address and all other correspondence should be addressed to the Secretary of Sigma Xi, Edward Ellery, Union College, Schenectady, N. Y.